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ABSTRACT

The purpose of this study was to determine whether getting students involved in analyzing issues critically would help them develop effective critical thinking skills. The subjects were 113 students, ages 17-60 years, freshmen through seniors, enrolled in freshman level courses at a southwest state university. These students responded to the Watson-Glaser Critical Thinking Appraisal, Form A, at the beginning of a semester. Following the initial test, students received instruction in critical thinking skills and analyzed critical thinking examples. After 14 weeks, the students responded to the Watson-Glaser Critical Thinking Appraisal, Part B. Data were analyzed using the paired-t test for each of the five subtests and total scores. Results showed significantly higher critical thinking scores on two subtests (Interpretation and Evaluation of Arguments) and the total test. It appears that the students improved their skills in these specific areas and mproved skills overall in critical thinking. (Contains 1 table and 16 references.) (JLS)

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TEACHING AND LEARNING CRITICAL THINKING SKILLS

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ABSTRACT

One hundred thirteen students enrolled in undergraduate classes responded to the Watson-Glaser Critical Thinking Appraisal, Form A at the beginning of a semester. Then, they were taught critical thinking skills and analyzed critical thinking examples. After 14 weeks, subjects responded to Watson-Glaser Critical Thinking Appraisal, Form B. Data were analyzed using paired-t tests. Results showed higher scores on all subscales in the second response and significantly higher scores on two subscales and the Total.

INTRODUCTION

Philosophers, psychologists, and educators have all used the concept of critical thinking in their disciplines. Philosophers reflect on the need to question assumptions, analyze data rationally, and have an empirical foundation of thought. Psychologists emphasize the cognitive structures involved in critical thinking and educators are concerned with the appropriate curricula in encouraging critical thinking (Young, 1980).

Chaffee (1988) defined critical thinking as "our active, purposeful, and organized efforts to make sense of our world by carefully examining our thinking, and the thinking of others, in order to clarify and improve our understanding" (p. 29). Dressel and Mayhew (1954) defined critical thinking as exclusively linked with abilities that are needed for solving problems, selecting pertinent information for solution of problems, recognizing assumptions, formulating hypotheses, drawing valid conclusions, and judging the validity of inferences.

There is a nationwide interest and emphasis placed on teaching and learning about thinking, reasoning and, especially, critical thinking (Ennis, 1987; College Board, 1983; Task Force on Economic Growth of Education Commission of the States, 1983; Commission on the Humanities, 1980). This emphasis may be partly due to the public awareness of the increasing

complexity of our societies and the world and the need to adjust and make effective, rapid changes for survival (Halpern, 1984; Nickerson, Perkins, & Smith, 1985).

Numerous institutions of higher learning and public schools throughout the country are offering courses in thinking and, especially, critical thinking. However, it has been shown (Jaeger & Freijo, 1975; Jones & Cook, 1975; Mitchell & Byrne, 1973) that strong attitudes, opinions, and biases affect the ability of some people to think critically. The purpose of present study was to determine whether teaching and getting students involved in analyzing issues critically would help students develop effective critical thinking skills. It was hypothesized that this approach to teaching and learning would make a difference.

METHODS

The subjects were 113 students enrolled in freshman level courses at a southwest state university. In this group, there were 32 (28.3%) men and 81 (71.7%) women, of which 57 (50.4%) were freshmen, 39 (34.5%) sophomores, 14 (12.4%) juniors, and 3 (2.7%) seniors. Their ages ranged from 17 to 60 years with a mean age of 23.1 years and a standard deviation of 7.94.

The instrument used to test critical thinking skills was the Watson-Glaser Critical Thinking Appraisal, Forms A and B (Watson & Glaser, 1980a). This test was developed based on Dressel and Mayhew's definition of critical thinking. The instrument includes problems, statements, arguments, and interpretations of data similar to those encountered at work and classroom, and in newspapers and magazine articles. It includes 80 objective test items, 16 for each of the five subtests (Inference, Recognition of Assumptions, Deductions, Interpretation, and Evaluation of Arguments). Judgments of qualified persons and results of research studies (Houle, 1943; Morse & McCune, 1957) have indicated that this test represents a valid estimate

of proficiency with respect to aspects of critical thinking (Watson & Glaser, 1980b). Reliability and validity studies have been reported in the Manual (Watson & Glaser, 1980b).

At the beginning of the semester, students signed a research release form and received credit toward their course grade if they met the requirements of the study. They responded to the Watson-Glaser Critical Thinking Appraisal, Form A. Then, they were taught critical thinking skills, and given problems (and brought some of their own) which were analyzed by the whole class, small groups, and individual students. After 14 weeks, these students responded to Watson-Glaser Critical Thinking Appraisal, Form B.

RESULTS

The data collected from the two forms of the test were analyzed using the paired-t test for each of the five subtests and total scores. The results (see Table 1) showed higher scores on the second responses to the test with significantly higher ($p < .006$) scores on two subtests (Interpretation and Evaluation of Arguments) and the Total test.

CONCLUSION

The subjects in this study reported significantly higher critical thinking scores on two subtests (Interpretation and Evaluation of Arguments) and the Total test. Thus, it could be stated that they improved their skills in those specific areas and generally overall in critical thinking. However, when one compares the two mean scores for this group with those reported in the Manual (Watson & Glaser, 1980b), one can raise some questions.

On their first responses to the test, subjects in this study (who were over 50% freshmen) had a mean score of 47.7 and a standard deviation of 10.0. These data can be compared to 1636 high school students who had a mean score of 48.5 and a standard deviation of 9.9 (Watson & Glaser, 1980b). On their second responses to the test, subjects in this study had a mean score of 51.0 and a standard deviation of 7.9 which can be compared with the 388 students in junior and

community colleges whose mean score was 51.9 and a standard deviation of 9.6 (Watson & Glaser, 1980b).

One must keep in mind that subjects in this study included individuals with a wide age range from 17 to 60 years and freshmen through senior levels students. Further studies might focus on subjects of similar age levels and college statuses. Also (in trying to keep the students' interests) a study might focus on limited vs extended periods of time for student involvement in analyzing critical thinking issues and problems.

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TABLE 1

MEANS, STANDARD DEVIATIONS, AND PAIRED *t*-TESTS FOR PRE- AND POSTESTS OF CRITICAL THINKING TEST FOR 113 STUDENTS (*df* = 1/112)

Critical Thinking Subtests	Test	*M*	*SD*	*t*-tests
Inference	Pretest	7.86	2.95	1.11
	Posttest	8.19	2.56	
Recognition of Assumptions	Pretest	9.48	3.59	1.72
	Posttest	10.17	3.34	
Deductions	Pretest	9.87	2.52	0.26
	Posttest	9.94	2.34	
Interpretations	Pretest	10.55	2.48	2.82*
	Posttest	11.31	2.45	
Evaluation of Arguments	Pretest	10.05	3.91	3.30*
	Posttest	11.34	2.30	
Critical Thinking (Total)	Pretest	47.69	10.03	4.12*
	Posttest	51.00	7.88	

*$p < .006$